Initial EPA Comments on
Storm Water Source Control Recontamination Evaluation Strategy Considerations
Terminal 4 Slip 1 and Slip 3 Upland Facilities
Portland, Oregon

Submitted: January 13, 2012

Following are EPA's initial comments on DEQ's draft outline entitled "*Portland Harbor Source Control Recontamination Evaluation Strategy Considerations*," [DEQ Evaluation Strategy outline] prepared by Alex Liverman, last updated December 13, 2011. These comments include preliminary review of *Storm Water Source Control Recontamination Evaluation: Terminal 4 Slip 1 and Slip 3 Upland Facilities* prepared by Formation Environmental dated August 12, 2010. These comments also consider *Appendix L SEDCAM Recontamination Modeling Report for Stormwater Source Control Measures* prepared by Integral Consulting and which is contained in the September 28, 2011 Arkema Stormwater Source Controls Measures Final Design document.

The objective of this document is to develop preliminary recommendations for moving forward and better defining EPA's role and position, and provide an initial response to be submitted to DEQ outlining EPA's recommendations and concerns regarding the proposed application of a sediment Recontamination Evaluation (RE) approach to the T4 site. EPA recognizes that the DEQ Evaluation Strategy outline is intended to initiate a discussion regarding recontamination evaluations for stormwater. EPA is providing these comments to facilitate further discussions and looks forward to working with DEQ to develop a consistent approach for performing stormwater recontamination evaluations at the Portland Harbor site.

Clearly define RE objectives

The objectives of the RE need to be clearly defined. DEQ's Evaluation Strategy outline presents an initial list of objectives under "Assumptions." The objectives for REs could include:

1. Assess the relative potential for recontamination of river sediments from specific upland sites or groups of sites following in-water remedies.
2. Provide a consistent approach for assessing the potential for sediment recontamination due to storm water from various outfalls and after implementation of upland SCMs
3. Serve as a screening methodology to prioritize the need for additional monitoring or data collection at a particular site or for assessments amongst sites for a particular Chemical of Concern (COC)

Demonstrating that sites will not become recontaminated by COCs is particularly important because COCs are the primary target of the cleanup action, and there is concern that future storm water discharges could result in recontamination.

Establish an analysis framework

It is advantageous to define an evaluation framework for performing REs which is generally acceptable to the regulatory team. The framework should provide the context for review and evaluation of REs and clearly define how the information generated can be used in the regulatory decision-making process. For stormwater, the evaluation framework should build on the Framework for Portland Harbor Storm Water Screening Evaluations presented as Attachment D of the Joint Source Control Strategy.

Given the differences between sites and the number of COCs, it is unlikely that the RE framework will be "one size fits all." Therefore the RE approach must be sufficiently flexible to accommodate simple screening methods (e.g., SEDCAM approach) as well as more robust analytical methods.

The RE framework should consider and incorporate a range of elements of the Portland Harbor project including Joint Source Control Strategy, RAOs and RGs developed for the in-water portion of the Portland Harbor site, contaminant loading estimates developed for the PH site, the LWG fate and transport modeling approach, the design, implementation and monitoring of source control measures and the characterization procedures used to characterize stormwater.

The framework should also consider the appropriate timeframe for the stormwater RE in relation to various elements of each project. It should be clear when the RE would be performed. The following questions merit additional discussion

- Would the RE be performed for all high and medium priority stormwater pathway sites once that determination was made?
- Would it be performed once EPA selects an in-water remedy?
- Would it be performed once stormwater source control measures have been implemented?
- Would it be performed to support EPA's development of the proposed plan and ROD?

Selection of RE modeling tool(s)

DEQ is suggesting sole use of SEDCAM as the screening model to be used for RE applications. The limitations of SEDCAM, a steady-state box model which was developed to evaluate natural recovery of contaminated sediments at cleanup sites, should be clearly understood and acknowledged. There are relatively few peer-reviewed applications of SEDCAM relative to other modeling tools and most applications do not provide typical model calibration/ verification results.

SEDCAM's stormwater inputs are based on average annual runoff and average COC concentrations. In reality, sediment transport is very episodic and typically driven by infrequent extreme events which can result in severe erosion and bypassing or overflows of upland BMPs. Using average runoff and concentrations will tend to underestimate the impact of extreme events. Similarly, SEDCAM uses upstream sediment inputs based on average flows and concentrations.

In certain cases, screening-level models like SEDCAM may be applied to cost-effectively demonstrate that certain contaminants do not require expensive dynamic simulation modeling studies or additional water quality monitoring. However, the modeling tool should not be used as a standalone tool but rather as a screening level model and/or line evidence for assessing recontamination potential. In addition, depending on the results of the SEDCAM modeling approach, a more robust modeling approach may be required to better understand the potential for recontamination. The framework should allow for incorporation of more robust approaches as necessary.

Quality Assurance

A Quality Assurance Project Plan (QAPP) is recommended for sediment RE analyses utilizing models such as SEDCAM. One approach would be for EPA and DEQ to jointly develop a QAPP template to be used for any site-level RE. Another approach would be to require a QAPP be submitted prior to performing a RE. QAPP requirements can be found in EPA's guidance document "Guidance for Quality Assurance Project Plans for Modeling EPA QA/G-5M" (see http://www.epa.gov/quality/qs-docs/g5m-final.pdf).

Many of the issues identified in DEQ's Evaluation Strategy outline would be addressed by a modeling QAPP. For example, EPA's modeling QAPP guidance notes that:

> *In order to be able to use model output for anything from regulatory purposes to research, you should be sure that the model is scientifically sound, robust, and defensible. The way to ensure this is by following a thorough planning process that incorporates the following elements:*
>
> - *a systematic planning process including identification of assessments and related performance criteria;*
> - *peer reviewed theory and equations;*
> - *a carefully designed life-cycle development process that minimizes errors;*
> - *documentation of any changes from the original plan;*
> - *clear documentation of assumptions, theory, and parameterization that is detailed enough so others can fully understand the model output;*
> - *input data and parameters that are accurate and appropriate for the problem;*
> - *output data that can be used to help inform decision making.*

The steps for documenting these processes should be described in a QAPP for sediment RE modeling efforts. The QAPP should include special emphasis on the following elements

Quality Objectives and Criteria for Model Inputs/Outputs – The QAPP should clearly define data quality objectives (DQOs), performance criteria, and acceptance criteria. . The intended uses of the output of the modeling project to achieve the RE should also be defined.

Model Calibration – Model calibration should consider the objectives of RE and provide acceptance criteria. Model calibration procedures should be presented as well as method(s) of

acquiring input data. Model calibration should consider the types of output generated by the model calibration and define approaches to characterize uncertainty (e.g., sensitivity analysis)

Stormwater Loads

As noted above, stormwater loads are a critical input for a site level RE using a SEDCAM approach. As noted in EPA's comments (submitted October 26, 2011) on the Terminal 4 Source Control Completion Report dated September 28, 2011, there is an insufficient number of storm event samples (n=3) to conclusively confirm the mean and range of the COCs in runoff. Moreover the sampling method, which relied on a single grab sample collected during the first three hours of an event, does not provide representative storm event concentration.

SEDCAM Parameters

DEQ's Evaluation Strategy outline correctly identifies that there are numerous parameters which must be estimated in order to conduct the SEDCAM analysis. Due to the simplistic nature of the SEDCAM model, parameterization of the model should rely on conservative assumptions. Long-term simulations using SEDCAM may be very misleading because as a steady state model, it does not account for any year-to-year hydrologic variability. Similarly, COCs are defined simply using averages based on monitoring results. A conservative approach might consider applying dry-year hydrology for upstream sources combined with wet-year hydrology for storm water sources.

Net Sedimentation Rate: The use of sequential bathymetric surveys to estimate net sedimentation rate is highly uncertain. The reported margins of survey error typically exceed the calculated deposition rate. A special study focusing on sedimentation in the vicinity of storm water outfall(s) may be warranted to better define this important rate parameter and to augment.

Depositional Area: DEQ's Evaluation Strategy outline correctly identifies the depositional area as a critical parameter for which there is currently no robust method for approximating. SEDCAM assumes uniform sedimentation over the entire depositional area. The RE approaches using in existing studies include:

- Terminal 4 – the depositional areas are not clearly defined. They appear to be based on the Removal Action Areas (RAA) that include Modified Natural Recovery (MNR) in river areas. (source: Table 2-1 *Storm Water Source Control Recontamination Evaluation: Terminal 4 Slip 1 and Slip 3 Upland Facilities* prepared by Formation Environmental dated August 12, 2010
- Arkema - The depositional area was estimated at 9.55 acres, assumed to extend from the riverbank to the navigation channel and from Outfall 004 to the northern end of Lot 1 (source: section 3.2 p 3-3, *Stormwater Source Control Measures Appendix L SEDCAM Recontamination Modeling Report* Integral Consulting September 30, 2011).

These approaches to estimating depositional area do not appear to be conservative and should be refined.

Initial Surficial Sediment Concentrations – The previous Terminal 4 and Arkema SEDCAM analyses assumed the initial surficial sediment concentration in the depositional area to be 0, representing a remediated (e.g., capped) scenario. This assumption may ignore contributions from other nearby outfalls or residual legacy concentrations.

Sediment Density – The average dry bulk density of sediment should be measured from samples collected within the preliminary depositional area boundary at the site.

Regulatory Mechanisms.

The ranges of regulatory mechanisms presented in DEQ's Evaluation Strategy outline (under item D, page 5) seems to be on the right track. Additional discussions between EPA and DEQ will be required since the regulatory framework for source controls is likely to be an important element of the Portland Harbor Record of Decision.